mentary scientific facts, generally illustrated by reference to phenomena which may fairly be expected to have come under the notice of an average youth, and by a few simple experiments, which the student is intended to repeat; the second part of each chapter indicates the application of the scientific facts thus inculcated to some portion of the miner's experience in the pit. Like all books that set out to teach only such portions of a science as find direct application in any particular branch of technology, this work deliberately sacrifices the educational value of science in order to arrive more rapidly and more easily at the results derived from the acquisition of scientific facts. It is undoubtedly a very good thing that a coal-miner should be thoroughly familiar with the fact that a combustible material intimately mixed with air forms an explosive mixture, but the acquisition of any number of such fragments of knowledge, however valuable in themselves, does not provide the mental training that is obtained by the systematic study of any branch of science. Such a book as the one under discussion should not therefore be regarded as an adequate substitute for scientific education, but at best as an introduction and an incentive to further and more regular study of the sciences involved. It is a book that may fairly be recommended to the higher classes of an elementary school in a coal-mining district, with the hope that it may give the lads a desire to pursue their scientific studies further in evening continuation schools, where they would take a regular course of easy chemistry or physics, or both.

The work upon the whole is well done; the main pitfalls in such a book lie in the direction of slipshod statements on the one hand and over-elaboration on the other. As an example of the former we may quote the statement on page 118 that hydrogen "is a colourless gas, violently explosive," and of the latter the attempt to teach the molecular structure of gases on page 2. The authors have, however, generally succeeded in steering their course fairly between either extreme, and the result is a book which should, as already said, be quite useful to beginners, and will leave them very little indeed to unlearn when they begin to advance further in their scientific studies.

MATHEMATICAL SCHOOL-BOOKS.

(1) *Arithmetic. Parts I., II., and III., complete with Answers.* By C. Godfrey and E. A. Price. Pp. xiii + 467. (Cambridge: At the University Press, 1915.) Price 4*s.*; without answers, 3*s.* 6*d.*

(2) *Pendlebury's New Concrete Arithmetic. Sixth Year.* By C. Pendlebury and H. Leather. Pp. 80. (London: G. Bell and Sons, Ltd.) Price 6*d.*

(3) *Plane Trigonometry.* By H. Leslie Reed. Pp. xiii + 290 + xvi. (London: G. Bell and Sons, Ltd., 1915.) Price 3*s.* 6*d.*

(4) *Statics. Part II.* By F. C. Fawdry. Pp. 159–305 + viii. (London: G. Bell and Sons, Ltd., 1915.) Price 2*s.*

(5) *Numerical Examples in Physics.* By H. S. Jones. Pp. xii + 332. (London: G. Bell and Sons, Ltd., 1915.) Price 3*s.* 6*d.*

(6) *Exercises in Laboratory Mathematics.* By A. W. Lucy. Pp. 245. (Oxford: At the Clarendon Press, 1915.) Price 3*s.* 6*d.*

THE ideal text-book of arithmetic still remains to be written, and the time has not yet come when the ideal book would be a financial success. It will equip the boy or girl with the knowledge of the subject necessary for his other studies and his after-life. It will drop some branches which have in the past had usefulness but are now useless, and it will refrain from dealing with problems the subject-matter of which is outside a boy's experience and unintelligible to him, even if the calculation involved is simple once the subject-matter is understood. The ideal book with our present imperial system of weights and measures will easily be comprised within a hundred pages, and when the imperial system is dropped and the metric system becomes general the length will be further reduced.

The discussion of prime factors, greatest common measure, and least common multiple leads up to the extraction of square and cube roots, the reduction of fractions to their lowest terms, the addition of fractions, and the simplification of complicated expressions. Now the final convenient form for any fraction (except the very simplest) is the decimal form, and instead of reducing a fraction to its lowest terms we turn it straight away into a decimal. For the addition of fractions, in place of the vulgar method with all the labour of common denominators, we convert each fraction to a decimal (to as many significant figures as we need), and then add. Complicated expressions rarely turn up in natural problems; they are in the main the invention of examiners and text-book writers. Very little time, therefore, need be spent upon prime factors, greatest common measure, and least common multiple, and these will occupy little space in the ideal text-book.

"Stocks and shares" should also be omitted. The arithmetic is of the simplest. The trouble is partly in the difficulty of the subject-matter, partly in the unfamiliarity of the subject-matter, and partly in the unsuitable nomenclature, so poor in distinctions between face value and selling value, and so full of terms among which master and boys are equally at sea.

Some schools neglect arithmetic sadly, while others give it far more time than its real worth deserves. The latter group are responsible for the bulk of the present-day text-book, in their demand for endless examples. In these schools the correction of the overcrowded time-table will in time reduce the number of periods allotted to arithmetic, and the text-book will be reduced to a fraction of its present size.

(1) Meantime we have to make the best of present conditions, and Messrs. Godfrey and Price have produced a most usable arithmetic. While compelled to run to above four hundred pages and include all the customary items and tricks (except recurring decimals, for which omission we are thankful), they show in the preface how they would prefer to use the boy's time. Their explanations of difficult points are accurate, concise, and clear; see, for instance, their discussion of fractions. They have regard also to the recommendations of various open-minded and wise bodies, such as the Headmasters' Conference, the British Association Committee on type in school-books, and the Mathematical Association Committee. The book is to be highly recommended; it provides work for the most lavish use of time, and the wise master who limits the time for arithmetic has a wide choice in his selection of work.

There is much gain in clearness of type by the use of the solidus, for instance, in printing "19/20" to stand for nineteen-twentieths, but it is a pity to use the symbol to denote shillings in the same book.

In elementary schools, also, arithmetic is in a bad way. Not that the boys don't do it well. They do it only too well, and can tackle the most abstruse questions which, if done at all, ought to be done by algebra. Further, they can (or are expected to) tackle questions which are unintelligible to the plain, well-educated man; in these questions conventional meanings, used only in schools, are put upon phrases which are otherwise meaningless. That abomination, the recurring decimal, is firmly entrenched in the elementary school, and children are told to commit to memory the expressions as recurring decimals of all proper fractions with denominator 7. After such enormities it seems quite natural to find the children required to add together 6 days and 23 seconds, or 16 kilometres and 2 millimetres.

(2) In the "New Concrete Arithmetic" the authors are doing the best that is possible in the circumstances. The whole gamut of absurdities must be included if the book is to sell, and so long as the present excessive allowance of time is given to the subject it is difficult to provide a sufficient number of varied questions without degenerating at times into unsuitabilities. The idea of first presenting every rule in concrete form is good; it might be carried further, and require every question to be such as naturally arises in human life. It would be still better to require every question to be such as arises in the pupil's own environment, so that there might be a rural arithmetic for the country school and various kinds of industrial arithmetics for town schools. Before such arithmetics are possible, however, the time allotted to the subject must be severely cut down. For to restrict the book to natural human problems and such bookwork as is necessary for their treatment, means the excision of many whole sections.

Let us repeat that we impute no blame to Mr. Pendlebury and Mr. Leather, who do the best that circumstances allow. In everything the book is as good as others of the kind, and in beginning from the concrete it is miles ahead of the bulk of them.

(3) In trigonometry also the mathematical master—or the headmaster or somebody—sets apart too much time for the subject. The time has to be filled in, but how can it be done without "Identities"? Identities being fashionable must be included in any book that is to be a success on the market. Mr. Reed is not to blame; he cannot help himself. First let the time allowed in the school for mathematics as a whole, or for trigonometry, be cut down, and Mr. Reed will write you a good book. He will discard identities, and identities being gone he will discover that secants and cosecants and tangents have no use except for the specialist and for the making of identities, and he will drop them.

In the meantime Mr. Reed does what is possible. He begins the solution of triangles by formulas most of which result immediately from geometrical properties. In the only case that presents any difficulty, that in which three sides are given, the method of solution is due to Prof. Bryan; expressions are found for the sum and difference of the two portions into which a side is divided by a perpendicular from the opposite vertex.

The variety of the questions which are taken from human life deserves high praise; it is only by long-continued effort that they could have been collected.

We regret, however, to find results left in surd form, as on pages 140 and 141, with the remark that they "may be worked decimally." We should have expected Mr. Reed to set a good example by "working them decimally" himself.

(4) This book—"Statics," by F. C. Fawdry—can be confidently recommended. The problems dealt with come from house-building, bridge-building, engineering, and other human activities. We no longer meet the ridiculous and perfectly smooth elephant who balances himself on a perfectly rough cricket ball. The good and simple methods of the engineer, hitherto excluded from the school-book, now come to their own, and the book discusses within the limits of 150 pages the link polygon, Bow's notation, the bending of beams, brake horse-power, and three dimensional problems, and discusses them well. The only fault we have to find is that the author cannot spell *parallelepiped*.

(5) We scarcely know what to say about this book of Examples in Physics. It is most virtuous in drawing all its exercises from human life, or at least from the laboratory. There are none of the wicked old questions that prevailed when an irresistible projectile used to impinge on an immovable obstacle. But, after all, what shall it profit a man to work through all these virtuous questions and be unable to tell a galvanometer from a lens? The examples should surely go with work in the laboratory; and if a man works in a laboratory he finds his own data there, and does not want to have them supplied in a book.

(6) This is a good, honest, plodding book, providing all the intellectual apparatus we are entitled to get under the name of "Laboratory Mathematics," but scarcely with the clearness of statement and crispness of effect that the ideal book would have. The attempt to consider weight and mass separately is somewhat ambitious for a book of this range; until quite an advanced stage it is better for the student to be content with one of them. Again the term "specific density" is unfortunately like "density" to use for so different a meaning as the author gives it, and the distinction between "specific density" and "specific gravity" is too subtle for the ordinary mortal.

D. B. M.

OUR BOOKSHELF.

Amoebiasis and the Dysenteries. By Prof. L. P. Phillips. Pp. xi+147. (London: H. K. Lewis, 1915.) Price 6*s*. 6*d*. net.

DYSENTERY is a clinical term used to denote disease conditions running more or less the same course, but dependent upon various ætiological agents. The subject is one of great and growing importance, and the advance in our knowledge of it has of late been considerable, but the literature is much scattered. In the volume under review Dr. Phillips has summarised the whole subject, and has compiled a book which should be of considerable value and assistance to all those who have to deal with this disease.

The various forms of dysentery are discussed from the point of view of their causation, viz., amœbiasis or amœbic infection, ciliate and flagellate dysentery, bilharzial dysentery, and bacillary dysentery. Amœbic dysentery is caused by infection with an amœbiform protozoon, now known as the *Entamoeba histolytica*. A full description is given of this parasite and of its differentiation from other forms of amœbæ. There is so far as at present known only one organism causing amœbic dysentery, and this cannot be artificially cultivated, though several saprophytic forms seem to have been grown in the laboratory.

There is undoubtedly a form of dysentery due to infection by a ciliate organism, *Balantidium coli*, and the disease is probably not so rare as the published cases seem to show. Several flagellate protozoa are also under suspicion as causal agents in dysentery or dysenteric diarrhœa.

A very chronic form of dysentery is associated with bilharzial infection of the large intestine, particularly in Egypt; the parasite in this case is a worm. Lastly, there is the bacillary form of the disease, due to a bacillus of world-wide distribution, and apt to occur in epidemics, thus differing from amœbic dysentery.

Under each section, besides the description of the parasites, the symptoms and treatment are detailed so that this work forms a complete handbook on the subject of dysentery. A useful bibliography is appended.

R. T. H.

Alcoholometric Tables. By Sir Edward Thorpe. Pp. xiv+91. (London: Longmans, Green and Co., 1915.) Price 3*s*. 6*d*. net.

THE handy little book of alcohol tables prepared by the late Dr. Stevenson has been out of print now for several years, and a convenient volume, arranged on similar lines and brought up to date, has been a long-felt want. This is fully supplied by the tables under notice, which were compiled under Sir Edward Thorpe's directions at the Government Laboratory. They are based, as regards their main portion, upon the work of Blagden and Gilpin, Drinkwater, Mendeléeff, and the Kaiserliche Normal Eichungs Kommission. The first table shows the percentage of alcohol by weight and by volume, and the percentage of fiscal proof spirit, in aqueous solutions of ethyl alcohol of different specific gravities. The latter are given to four places of decimals, but for the even numbers only (*e.g.*, 0·9172, 0·9174, etc.). The one criticism suggested is whether it would not have been worth while to include the odd numbers as well. True, this would have made the book about half as large again, but it would have saved the user many small calculations.

The other tables serve for the comparison of the spirit values adopted for fiscal purposes in this country with those of the principal foreign countries. They show the indications of Sikes's hydrometer, with the corresponding percentages of British proof spirit, American proof spirit, and alcohol as evaluated on the French, German, and